

February 7, 2002

Marlene H. Dortch
Secretary
Federal Communications Commission
Washington, DC 20554

Re: *Proposal by the Wireless Communications Association International, Inc.,
the National ITFS Association and the Catholic Television Network for Revising the MDS
and ITFS Regulatory Regime -- RM 10586*

Dear Ms. Dortch:

On behalf of the Wireless Communications Association International ("WCA"), the National ITFS Association ("NIA"), and the Catholic Television Network ("CTN"), we hand you herewith a second supplement to the white paper that WCA, NIA and CTN filed on October 7, 2002 proposing various changes to the Multipoint Distribution Service ("MDS") and Instructional Television Fixed Service ("ITFS") regulatory regime. This second supplement provides the Commission with specific proposals regarding issues that the white paper identified as being the subject of ongoing discussion within the industry and seeks to respond to a handful of concerns that have been raised in the weeks since the white paper was filed.

Should you have any questions regarding this submission, please contact the undersigned.

Respectfully submitted,

THE WIRELESS COMMUNICATIONS
ASSOCIATION INTERNATIONAL, INC.

THE NATIONAL ITFS ASSOCIATION

By: /s/ Paul J. Sinderbrand

By: /s/ Todd D. Gray

Wilkinson Barker Knauer, LLP
2300 N Street, NW
Suite 700
Washington, DC 20037-1128
(202)783-4141

Dow Lohnes & Albertson, pllc
1200 New Hampshire Ave., N.W.
Suite 800
Washington, DC 20036-6802
(202) 776-2571

Counsel for NIA

Counsel for WCA

CATHOLIC TELEVISION NETWORK

By: /s/ Edwin N. Lavergne

Shook Hardy & Bacon, LLP
600 14th Street, N.W.
Suite 800
Washington, DC 20005-2004
(202) 639-5603
Counsel for CTN

ATTACHMENT

cc: Bryan Tramont
Jennifer Manner
Paul Margie
Samuel Feder
Barry Ohlson
Kathleen O. Ham
Shellie Blakeney
D'Wana R. Terry
John J. Schauble
Charles Oliver

SECOND SUPPLEMENT TO “A PROPOSAL FOR REVISING THE MDS AND ITFS REGULATORY REGIME”

On October 7, 2002, the Wireless Communications Association International, Inc. (“WCA”), the National ITFS Association (“NIA”) and the Catholic Television Network (“CTN”) submitted a white paper to assist the Wireless Telecommunications Bureau staff in its efforts to revise the rules and policies governing the Multipoint Distribution Service (“MDS”) and Instructional Television Fixed Service (“ITFS”).¹ Within the white paper, WCA, NIA and CTN indicated that there were several issues, primarily of a technical nature, that were still being evaluated. On November 14, 2002, WCA, NIA and CTN submitted its first supplement to the white paper to report on the substantial progress WCA, NIA and CTN have made in resolving several of those open issues and to address a few concerns that have been expressed within the industry subsequent to the filing of the white paper. This second supplement is being submitted to advance solutions to two of the open technical issues that were identified in the white paper regarding operations outside the MBS.

A. Operational Spectral Mask for Base Stations

In the white paper, WCA, NIA and CTN initially proposed that MDS/ITFS equipment should be designed for use outside the MBS such that on any frequency outside a licensee’s frequency block, the power of any emission is attenuated below the transmitter power (P_{watts}) by at least $43 + 10 \log(P_{\text{watts}})$ dB, unless otherwise agreed to by the affected licensee.² However, recognizing that more stringent limits on out-of-band emissions may be necessary in cases where adjacent licensees deploy non-compatible technologies,³ they also proposed that under certain

¹ “A Proposal To Revise The MDS and ITFS Regulatory Regime,” Wireless Communications Ass’n Int’l, Nat’l ITFS Ass’n and Catholic Television Network, RM-10586 (filed Oct. 7, 2002)[“White Paper”]. Ten days later, the Wireless Telecommunications Bureau issued a *Public Notice* soliciting public comment on the white paper. See “Wireless Telecommunications Bureau Seeks Comment on Proposal to Revise Multichannel Multipoint Distribution Service and the Instructional Television Fixed Service Rules,” *Public Notice*, DA 02-2732, RM-10586 (rel. Oct. 17, 2002).

² See White Paper, at 29. As WCA, NIA and CTN explained in footnote 6 to the First Supplement, the Commission should require that all measurements relating to MDS/ITFS out-of-band emission limits be taken consistent with the provisions of Section 24.238(b) of the Rules, which applies to the broadband PCS mask. See 47 C.F.R. §24.238(b)(“Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.”). In addition, as they noted in that same footnote, consistent with the provisions of Section 24.238(c) and (d) and Section 27.53(a)(6) and (7), the WCS spectral mask, the MDS/ITFS rule should provide that “when measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee’s frequency block edges, both upper and lower, as the design permits” and that “the measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.”

³ Compatible technologies should be considered present when neighbors both deploy FDD upstream, both deploy FDD downstream or both deploy TDD systems that are synchronized so that they both operate upstream or downstream at precisely the same time. Note that WCA, NIA and CTN have proposed that the LBS be restricted to

circumstances a licensee operating outside the MBS should be required to provide greater attenuation. The specifics regarding this proposal for additional attenuation have raised several questions, which WCA, NIA and CTN wish to address.

To clarify its proposal, WCA, NIA and CTN believe that each base station, in addition to complying with the general mask discussed in the white paper, should be required to provide additional out-of-band emissions attenuation as follows:

- Every licensee should be required after receipt of a written request from any other licensee with a GSA that overlaps the GSA of the recipient licensee to take such steps as are necessary to manage out-of-band emissions of base stations located within the overlap area such that they are attenuated below the transmitter power (P_{watts}) by at least $67 + 10 \log(P_{\text{watts}})$ dB measured 3 MHz and beyond inside the frequency block of the requesting licensee.⁴ Although WCA, NIA and CTN are not suggesting that all licensees be required to meet this strict standard (because doing so would impose costs and spectral inefficiencies that are likely to be unnecessary in cases where adjacent licensees utilize compatible technologies), this level of attenuation is readily achievable utilizing a combination of equipment and network designs.⁵ As such, each licensee should bear its own costs associated with complying with this requirement.
- While compliance with the $67 + 10 \log(P_{\text{watts}})$ dB attenuation requirement generally will be satisfactory, additional attenuation should be required where base stations are located

upstream use if FDD technology is deployed and that the UBS restricted to downstream use if FDD technology is deployed. *See id.* at 16. Adoption of this proposal will maximize the use of compatible technologies by assuring that when FDD technology is deployed by a given licensee, it will have limited potential to interfere with any neighboring FDD users.

⁴ To illustrate the application of this rule, if the licensee of channel A3 (2511-2516.5 MHz) requests that the licensee of channel B1 (2516.5-2522 MHz) comply, the licensee of channel B1 will have to assure that its emissions are attenuated by at least $67 + 10 \log(P_{\text{watts}})$ dB at all frequencies below 2513.5 MHz (*i.e.* 3 MHz in from the nearest A3 channel edge). Within the 2513.5-2516.5 band, the licensee of channel B1 will be required to comply with the general $43 + 10 \log(P_{\text{watts}})$ dB requirement. Similarly, the licensee of channel A3 will be required to attenuate its emissions by at least $67 + 10 \log(P_{\text{watts}})$ dB at all frequencies above 2519.5 MHz (*i.e.* 3 MHz in from the nearest B1 channel edge). As discussed at page 29 of the White Paper, the written request must certify that the requesting licensee intends to initiate service on the affected adjacent channel group on a date certain (not more than 1 year after the date of the notice), and that the additional attenuation is required due to the respective technical characteristics of its planned facilities and those of the party receiving the request. The request must also provide currently available information with respect to its planned network design comparable in scope to the information required to be filed upon completion of construction of its facilities. The requesting licensee should have an ongoing obligation to advise the recipient of any changes to the network design and any changes as to the date certain on which it will commence service. The recipient should be obligated to meet the more stringent requirement by the date certain specified in the initial request or any supplement thereto (but no earlier than 90 days after receipt of a request or supplement). The licensee making the request must after the date certain specified in its request or any supplement manage its system to provide the same more stringent level of attenuation for the benefit of the recipient licensee.

⁵ Note that a given licensee should be given the freedom to enter into agreements with adjacent channel licensees to accept greater or lesser out-of-band attenuation, and that such agreements should control.

in close proximity to each other in order to avoid interference to the base station receiver. Thus, it is proposed that if a licensee deploys a base station within 1.5 km⁶ of another licensee's pre-existing adjacent channel base station,⁷ unless the licensee of the pre-existing station has agreed otherwise, the licensee deploying the new base station should be required to attenuate its out-of-band emissions measured 3 MHz beyond its frequency block: (i) in the case of non-located base stations, by $67 + 10 \cdot \log(P_{\text{watts}}) - 20 \cdot \log(d\text{KM}/1.5)$ dB, where dKM is the distance in kilometers between the two base stations;⁸ and (ii) in the case of collocated adjacent channel stations, the newcomer should be required to construct its base station so that the undesired receive signal level measured at each pre-existing receiver (*i.e.* after the reception antenna and line) is no more than -107 dBm. The licensee deploying the new base station should bear the costs it incurs to comply with this requirement.

- In the situation presented in the preceding bullet point (*i.e.* a licensee deploys a base station within 1.5 km of a pre-existing base station), the licensee of the pre-existing base station should be required to make reasonable modifications to that base station to reduce out-of-band emissions to no less than the levels called for by the preceding bullet point, if requested to do so by the newcomer and provided that such modifications do not result in more than a *de minimis* reduction or degradation of the existing service or increase in ongoing costs. Because these extraordinary modifications are being undertaken to benefit the newcomer that has chosen to locate in such close proximity that attenuation to $67 + 10 \log(P_{\text{watts}})$ will not be adequate, all modifications undertaken pursuant to this bullet point should be at the expense of the licensee deploying the new base station.

B. Requirements For Mitigating Co-Channel Interference Outside The MBS Between Non-Compatible Technologies.

As was discussed in detail in the white paper, the development of rules designed to minimize interference among stations operating on the non-MBS channels is complicated by the need to support flexible use and provide for the use of a variety of technologies.⁹ The challenge in developing rules has been to provide for maximum technology flexibility, while at the same time avoiding the imposition on all licensees of interference-protection restrictions that may only

⁶ In the White Paper, WCA, NIA and CTN initially proposed using a 0.92 mile separation distance. However, they now believe that for simplicity's sake, the Commission should instead use 1.5 km, which is virtually identical.

⁷ WCA, NIA and CTN have proposed that upon deployment of any base station, a notice filing be made with the Commission. See White Paper, at 24. This notice will allow a licensee deploying a new base station to identify all pre-existing base stations of other licensees in its service area and comply with this requirement where necessary.

⁸ This formula reflects the fact that attenuation by $67 + 10 \log(P)$ does not provide sufficient protection for closely-spaced base stations and was derived from the formula: Attenuation = $33 + 10 \cdot \log(P_{\text{watts}}) - 20 \cdot \log(d\text{KM}/1.5) + G_i + G_v$ dB, where G_i is gain of interfering base station antenna in dBi and G_v is gain of victim hub antenna in dBi. For the sake of simplicity, WCA's Technical Task Group has recommended that it be assumed in all cases that a 17 dBi antenna is employed at base stations, thus yielding the simpler formula WCA, NIA and CTN are proposing.

⁹ See White Paper, at 27-28.

be necessary in worst-case situations.¹⁰ This has been particularly difficult with respect to the development of rules designed to address cochannel interference, since incompatible base stations may create interference to each other even with substantial separation distances due to the sensitivity of the base station receivers likely to be utilized in the band.

WCA, NIA and CTN proposed in the white paper that licensees operating on channels outside the MBS be required to restrict their field strength limit to 47 dB μ V/m measured 1.5 meters above ground level.¹¹ In so doing, however, WCA, NIA and CTN alerted the Commission that this standard would not be sufficient to mitigate cochannel interference in those situations where one licensee is transmitting upstream in one GSA while a cochannel licensee is transmitting downstream in a nearby GSA.¹² The problem, in a nutshell, is that where there is line of sight between the base stations involved, the transmissions from a base station in the first GSA (where the channel is used for downstream transmissions) can cause interference at the sensitive receivers of a base station in the nearby GSA (where the channel is used for upstream transmissions and the receivers at the base station must be sensitive enough to receive low power signals from subscriber units), even if the 47 dB μ V/m benchmark is met by the downstream transmissions at the GSA border.¹³

To address this problem, WCA, NIA and CTN have developed an approach they believe appropriately balances their desire to promote flexibility and the need to assure licensees sufficient protection against interference to spur investment in the band. Their approach is designed to protect the noise floor at the reception antennas of non-MBS base stations that have been constructed at heights within specified safe harbors against interference from cochannel signals generated by base stations in neighboring markets that have been mounted at heights in excess of specified safe harbors. More specifically, it has been designed to limit to no more than 1 dB the amount that any non-safe harbor base station can increase the noise floor at the receiving antennas of a cochannel base station constructed at a safe harbor height.

The WCA-NIA-CTN proposal starts with the establishment of maximum safe harbor heights for base station transmission and reception antennas. The safe harbor concept is intended to give licensees incentive to design their systems so that base station transmission and reception antennas are not prone to cause or suffer interference, while at the same time permitting licensees the flexibility to build facilities outside safe harbors within the framework of a cooperative coordination regime. Simply stated, a base station should be considered to be within its safe harbor relative to another base station as follows:

¹⁰ See *id.* at 24.

¹¹ See *id.* at 26-27.

¹² See *id.* at 27-28.

¹³ For example, absent terrain or other blockage, transmissions from atop a 113-foot tower would likely cause cochannel interference to the reception antennas at a 113-foot base station in a neighboring GSA even if each tower were 15 miles from the common GSA boundary, without regard to the power level of the downstream transmissions.

- To determine whether a base station transmission antenna *causing* interference to another base station is within its safe harbor, the transmission antenna causing the interference will be considered within its safe harbor if the height in meters of the antenna's centerline above the average elevation along the radial directly towards the base station receiving the interference is equal to or less than $D^2/17$ (where D is the distance in kilometers between the base station causing the interference and the point on that radial that intersects the boundary of the GSA of the station receiving the interference).¹⁴
- To determine whether a base station reception antenna *suffering* interference from another base station is within its safe harbor, the reception antenna suffering the interference will be considered within its safe harbor if the height in meters of the antenna's centerline above the average elevation along a radial directly towards the base station causing the interference is equal to or less than $D^2/17$ (where D is the distance in kilometers between the base station suffering the interference and the point on that radial that intersects the boundary of the GSA of the station causing the interference).¹⁵

In either case, consistent with Section 24.53 of the Rules, the radial average elevation should be calculated as the average of the elevation along a straight line path from 3 to 16 kilometers extending radially from the antenna site, and at least 50 evenly spaced data points for each radial should be required for any computation. Distances should be calculated assuming flat earth.¹⁶

It is important to emphasize that WCA, NIA and CTN are not proposing any restriction on the ability of a licensee in the first instance to construct facilities at a given location that do not comport with the applicable safe harbor antenna height for that location. Indeed, where cochannel licensees are transmitting in the same direction at the same time, the safe harbor concept will not even come into play. However, when non-compatible technologies are being

¹⁴ To address those anomalous situations where the antenna centerline above the average elevation along the radial is a negative number, the antenna should be considered within the safe harbor only if it is 1.5 kilometers or more distant from the border along the radial in question.

¹⁵ Again, if the antenna centerline above the average elevation along the radial is a negative number, the antenna should be considered within the safe harbor only if it is 1.5 kilometers or more distant from the border along the radial in question.

¹⁶ Consistent with Section 24.53(b), height above average elevation "shall be calculated using elevation data from a 30 arc second or better Digital Elevation Models (DEMs). DEM data is available from United States Geological Survey (USGS). The data file shall be identified. If 30 arc second data is used, the elevation data must be processed for intermediate points using interpolation techniques; otherwise, the nearest point may be used. If DEM data is not available, elevation data from the Defense Mapping Agency's Digital Chart of the World (DCW) may be used." 47 C.F.R. § 24.53(b). In addition, the MDS/ITFS rules should mimic Section 24.53(e) and provide that "The position location of the antenna site shall be determined to an accuracy of no less than ± 5 meters in both the horizontal (latitude and longitude) and vertical (ground elevation) dimensions with respect to the National Geodetic Reference System." 47 C.F.R. § 24.53(e). Finally, the Commission should make clear that in the event of a disparity in calculating the maximum safe harbor height for a given station caused by the use of databases with differences in the granularity of the elevation data, the calculations made using the finer data should be controlling.

deployed on a cochannel basis and the undesired receive signal level measured at the receiver (*i.e.* after the reception antenna and line) exceeds -107 dBm (*i.e.* it has more than a 1 dB adverse impact on the noise floor of the receiver),¹⁷ the safe harbor would work as follows.

It is necessary as a first step to determine whether the base station reception antenna suffering the undesired receive signal level in excess of -107 dBm has been constructed within its safe harbor. If the victim reception antenna has not been constructed within its safe harbor, the licensee of the station causing the undesired signal level in excess of -107 dBm would have no absolute obligation to reduce its received signal level at its own cost. However, it should have an obligation to cooperate in good faith with the other licensee to mitigate any interference. For purposes of the safe harbor rules, a good faith obligation to cooperate should not be read to require any licensee to take any action that would reduce or degrade its service or increase its costs by more than a *de minimis* amount.¹⁸

If, on the other hand, the victim reception antenna receiving the undesired signal level in excess of -107 dBm has been constructed within its safe harbor, the next avenue of inquiry is whether the transmission antenna of the base station causing the interference has been constructed within its safe harbor. If it has (*i.e.* if both the antenna suffering the interference and the antenna causing the interference are within safe harbors), then the licensee of the base station causing the undesired receive signal should not have any absolute obligation to reduce its signal level at its cost, although it should be required to cooperate in good faith to mitigate the interference.

However, if the transmission antenna causing the undesired receive signal level in excess of -107 dBm is constructed at a height in excess of the safe harbor height and if the reception antenna suffering the undesired signal is within its safe harbor height, then upon written request of the licensee of the receiving base station, the licensee of the transmitting base station, at its own cost, will take such measures as are necessary to immediately reduce the undesired receive signal level to -107 dBm or less (including, if necessary, immediately ceasing operations).

¹⁷ The -107 dBm benchmark should be measured across a 5.5 MHz bandwidth and adjusted accordingly for different bandwidths. The -107 dBm figure was derived as follows:

KTb Noise Floor	-106dBm
Noise Figure	5dB
	-101dBm
Margin for 1-dB Protection	<u>6dB</u>
	-107dBm

¹⁸ However, a licensee that is required to engage in good faith coordination must be required to make modifications to its facilities, so long as those modifications do not reduce or degrade its service by more than a *de minimis* amount and the other licensee pays all of the costs associated with such modifications.

The following matrix summarizes the obligations of cochannel licensees where the undesired receive signal of one exceeds -107 dBm at the receiver of another:

	Licensee of Receiving Station	Licensee of Transmitting Station
Both in Safe Harbor	Good faith cooperation only	Good faith cooperation only
Neither in Safe Harbor	Good faith cooperation only	Good faith cooperation only
Transmitting in Safe Harbor; Receiving above Safe Harbor	Good faith cooperation only	Good faith cooperation only
Receiving in Safe Harbor; Transmitting above Safe Harbor	Good faith cooperation only	Reduce receive signal level to - 107 dBm or less

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